UNITED STATES DEPARTMENT OF AGRICULTURE | FOREST SERVICE | SBNF

Reply To: 3420 Date: December 16, 1993

Subject: Insects and true mistletoe on California sycamores on Lytle Creek, Cajon Ranger District, San Bernardino National Forest (FPM Rep. S93-4)

To: Forest Supervisor, San Bernardino National Forest

On November 24, 1993, Karen McKinley, Assistant Rec. Officer, and I examined some California sycamore trees, Platanus racemosa, at Recreation Cabin 19 on Lytle Creek. These trees appeared to be infested with the clearwing moth, Synanthedon resplendens (Hy. Edwards), sometimes called the western sycamore borer.

Evidence of the infestation by the western sycamore borer included slight swelling of the lower few feet of the most heavily infested trees, flaking away of bark, giving it a roughened appearance, and the presence of reddish-brown frass in the cracks in the bark and around the base of the tree. The individual fecal pellets are much larger (up to 1 mm long) than those of bark beetles on pines. Chipping away the bark revealed winding larval galleries in the inner bark. Away from the galleries the inner bark was healthy and moist, as these insects are not known to vector fungal tree pathogens as many bark beetles do.

Upon close examination, cocoons and pupal cases were found. Of the few cocoons collected, about half contained pupal skins of parasitic flies, suggesting that some degree of natural control is being exerted by these enemies of the moth.

Approximately 20 trees in the vicinity of the Recreation Cabin were infested. Some were also infested with true mistletoe. It appeared that the most heavily infested trees also had the most severe mistletoe infestations, but we did not collect data to support or refute this observation. The most heavily infested tree had the lower 4 feet of bole mined, with some evidence of larval mines further up the bole.

Many of the trees were heavily infested with true mistletoe, Phoradendron macrophyllum.

Information on the biology and management of these two pests is attached. Please call me at (909) 383-5588 if you have further questions.

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cc: District Ranger, Cajon R.D.
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PEST BIOLOGY AND DAMAGE

Western Sycamore Borer, Synanthedon resplendens (Hy. Edwards)

The following information is from Brown and Eads (1965), Duckworth and Eichlin (1978), Johnson and Lyon (1988), and Cowles (pers. comm. 1993). Older, slow-growing, and injured plant tissue appear to be sites favored for attack; for example, older trees in general, limb crotches, or above vehicle inflicted and other wounds. Normally infestations are only on the lower part of the tree, up to a height of approximately 30 feet. Brown and Eads suggested that control measures were warranted if infestations were severe, particularly if the affected tree was a specimen landscape tree. Hosts of this insect include California sycamore, Platanus racemosa, and coast live oak, Quercus agrifolia. This insect has also been reported to attack avocado, Persea americana. The western sycamore borer is found from California to Washington and east to western Idaho.

There is one generation of this insect annually. The adults fly from May (or April in southern California) to early August. Although the adult moths are active during the day and mimic wasps, they neither sting nor bite. The ovoid golden eggs are 0.8 mm long and laid singly in small cracks and depressions on the bark of the tree trunk. Upon hatching, the larva bores into the inner bark and makes twisting tunnels which eventually cover ca. 100 square centimeters. Larval galleries overlap only when a tree is heavily infested. The mature larva is 18 mm long, pinkish white to dark pink with a reddish brown head capsule.

These clearwing moths should be considered to be primarily aesthetic pests. When infestations are severe they may debilitate the trees to some extent. These moths do not structurally weaken the trees, making them more susceptible to breakage, except in cases where limbs die from prolonged and severe attacks. Thus infestated trees need not be assumed to be hazardous to humans or property unless other indications, such as dead limbs, are present. It is likely that the infestation has existed on these trees for many years.

True mistletoe on sycamore, Phoradendron macrophyllum

The true mistletoe species infesting sycamore on Lytle Creek, Phoradendron macrophyllum, ranges from northern California into Mexico and east to western Texas. It parasitises at least 60 species in about 30 genera of hardwoods, including Alnus, Fraxinus, Juglans, Platanus, Populus, Prosopis, Robinia, and Salix, but not Quercus (Hickman 1993, and Sinclair et al. 1987).

The following information on true mistletoe is from Vogler and Schultz (1983):

> Like the dwarf mistletoes, the true mistletoes are flowering plants that require a living host to survive. They are generally less demanding of their hosts than the dwarf mistletoes, yet can be serious pests where individual trees are of high value, as in parks and campgrounds. Although they are completely parasitic, they produce many of their required nutrients by photosynthesis and usually require only water and minerals from their hosts. However, if the green aerial shoots of the mistletoe are

removed, the parasite's root system can utilize the host's nutrients and remain alive within an infected branch for many years.

Mistletoe infections are spread mainly by birds -- including robins, bluebirds, thrushes, and cedar waxwings -- that feed on the berries. Birds digest the pulp of the berries and excrete the living seeds, often depositing them onto susceptible trees. A viscous coating and hair-like threads on the outer surface of the seeds attach them firmly to twigs and branches, where they germinate and infect the host tissues.

Young or small trees are seldom infected by true mistletoes. In nearly all cases, initial infection occurs on larger or older trees because birds prefer to perch in their tops. Severe buildup of mistletoe often occurs in an already-infected tree because birds are attracted to the mistletoe berries and may spend prolonged periods feeding on them.

The damage caused by true mistletoes usually outweighs whatever economic or aesthetic value they may have. Severely infected trees are weakened, reduced in growth rate, and sometimes killed. Weakened trees are predisposed to attack by insects and often succumb to drought or other stresses. Branches heavily-laden with mistletoe may break during storms or high winds, and trunk swellings may provide entry to decay fungi, increasing the hazard to people and property in developed sites.

MANAGEMENT OPTIONS

1. Do nothing. Under this option, sycamore borer populations will probably continue at present levels or increase in numbers on weakened trees. In the absence of other damage agents, these insects are unlikely to have a significant impact on tree mortality.

True mistletoe will intensify, and other uninfested susceptible trees may become infected. Growth may be reduced in severely infected trees, which will be more susceptible to drought. Large mistletoe brooms and possible breakage at infection sites may make the infected trees hazardous to humans and property.

2. **Use of conventional insecticides.** When adult moths have emerged to mate and oviposit, conventional contact pesticides such as carbaryl may be sprayed on the affected portion of the bole of the tree. Spray must be carefully timed for the period when the adults are actually flying, which may require careful observation to determine. At present the pheromones of this species are unknown, thus flights cannot be monitored through the use of sexual attractants. Research in this area could lead to a good monitoring tool and a possible method of trapping out adult male moths in an area (Cowles, pers. comm.).

The use of conventional pesticides would reduce, but not eliminate, the level of sycamore borer attack on the sprayed trees. It would have no effect on the mistletoe.

3. **Use of pathogenic nematodes.** The nematode Sternoneima carpocapsae, readily available under the brand name Exhibit, can be used to control the larval

stages of this clearwinged moth. An aqueous solution of 500 nematodes/ square inch bark surface sprayed during the part of the year when larvae are present, gives a degree of control similar to that provided by conventional insecticides. This pathogen has the advantage of being less hazardous to the environment, and the timing of the application is less difficult to determine, as the insect spends the majority of the year in the larval stage. The nematode will not maintain itself in high enough numbers in the population to effect control in subsequent years and must be reapplied. This option would not effect the mistletoe population.

4. **Prune mistletoe-infected branches.** Mistletoe-infected branches may be pruned one foot or more below the infection site, preferably at the bole or nearest crotch. Care should be taken not to injur the bole when branches are pruned -- an inch or so stub should be left. Although this treatment will not eliminate mistletoe from the stand, 5-10 years are required for infections to rebuild to damaging levels. In general, branches larger than 4-6 inches should not be pruned as the large wounds thus created heal slowly and are likely to become extensively decayed.

This and other treatments aimed at reducing the levels of mistletoe are unlikely to impact the clearwing moth infestations already present. Once the bark has been injured and roughened by repeated attack, the moths will continue to utilize those trees. Sycamores do not have physiological mechanisms for pitching out newly hatched moth larvae, and are best protected by intact bark. Furthermore, even healthy, vigorously growing trees may be attacked, thus any relationship between tree health and vigor and attack by clearwings is at best tenuous.

5. **Remove mistletoe plants.** This will reduce some of the parasite's drain on the host and may impact local infection rates by removing the seed source. However, the portion of the mistletoe plant inside the host (the endophytic system) will continue to live and produce more shoots, thus this treatment must be repeated every 2-3 years.

6. **Wrap infected branches.** The mistletoe shoots may be cut flush with the limb or bole, the the infection site wrapped in black plastic to exclude light. This method is not particularly effective, is time consuming, and may result in damage to the limb from the presence of the plastic.

7. **Treat mistletoe with herbicide.** Ethephon (trade name: Florel) is registered for use on mistletoe foliage but is not effective at the label rate. Experimentally, mistletoe shoots have been cut off and the stubs treated with Ethephon, which has greatly reduced mistletoe regrowth. Asphalt based pruning paint was similarly effective, however, neither of these applications is registered. Adams et al. (1993) discuss mistletoe control with Ethephon.

8. **Planting of resistant trees.** Use of this method of reducing future impact from leafy mistletoe is much more difficult than with dwarf mistletoe, because of the different modes of spread of these two groups. P. macrophyllum has a broad host range and is likely to be carried by birds to other favored host trees. In contrast, dwarf mistletoe seeds are shot from the plants in a cone shaped pattern around an infected hosts, and the planting of nonhost species around an infected tree can prevent spread of the parasite.

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Other information was provided by Dr. Richard Cowles, Extension Entomologist, University of California, Riverside.

Get beetles before they're gone

by Lesley Hoffman

BIG BEAR VALLEY— A tree infested with the bark beetle can be cut down free of charge to the property owner by the California Department of Forestry — provided the beetles are still living in it.

The San Bernardino National Forest was declared a beetle-infestation area more than 30 years ago.

There are four or five different types of beetle, but in Big Bear the three to be concerned with are the *Dendroctonus jeffreyi* which attacks the Jeffery pines; the *Scolytus ventralis* — the fir engraver beetle — which devours the white fir; and the *Melanophila californica*, the California flatheaded borer, which eats both.

"By law, we can only take the trees that are infested," said the CDF's Captain Bob Clanton, who lives in Hesperia.

He was recently at Big Bear Lake's Pine Summit Campground with a five-man crew from Pilot Rock Conservation Camp to take down more than 20 dying trees.

"This is a joint effort between the CDF and the California Department of Corrections," he said. "We use minimum security state felons to do the work. They undergo rigorous training before they come out to fell trees.

"The primary reason for the joint effort is fire control," he said. "But when they are not fighting fires they break up into crews and do all kinds of work. They cut weeds, work on state highways — and work on the beetle program.

"You can see the taxpayers' money in action; this way the taxpayer gets a return for his money."

There is no charge for cutting down an infested tree, Clanton said, provided the job can be completed before the beetles kill the tree and move on to another.

"If we have marked a tree, then have to go and fight a fire," he said, "we may not be able to take the tree down if it's too late when we get back to it."

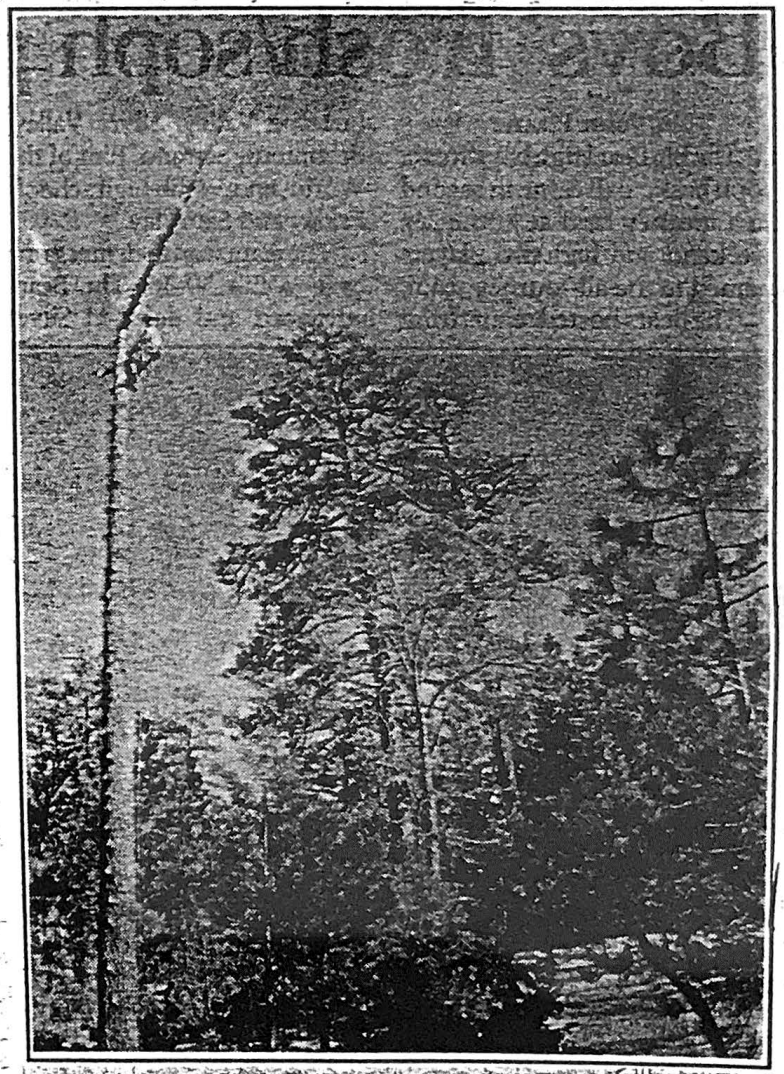
The owner of the property would then be responsible for paying to have the tree taken down by a commercial woodcutter. The expense can be considerable.

"The thing to do is to catch it early," Clanton said. "Beetle [-infested] trees generally die from the top down. Usually the top starts turning straw-colored. Then there are other things: hit marks and bleed marks. But you must remember, a healthy tree will not die from beetles, because they can ward the beetles off.

"The beetles have always been around, and they can sense a weak tree. They can only kill a tree that is not healthy. Of course, the drought really weakens the trees and perhaps that's why there are so many infested trees today.

"I've seen a tree completely turn in less than two weeks, but it depends on the time of year how long it takes. In the winter it is much slower."

Anyone who thinks they have a tree in the early stages of beetle infestation should call the CDF in Crestline at 338-2812.



A member of the California Department of Corrections lops off the tip of the infested white fir, having already stripped it of its branches. (Photo by Lesley Hoffman/The Voice)